Combined Heat and Power (CHP) for Missouri Institutional Facilities: Reducing Energy Costs, Lowering Emissions, and Increasing Resiliency

Eastern Missouri CHP Summit

Cliff Haefke

April 10, 2018

U.S. Department of Energy
CHP Technical Assistance Partnerships
CENTRAL

Agenda

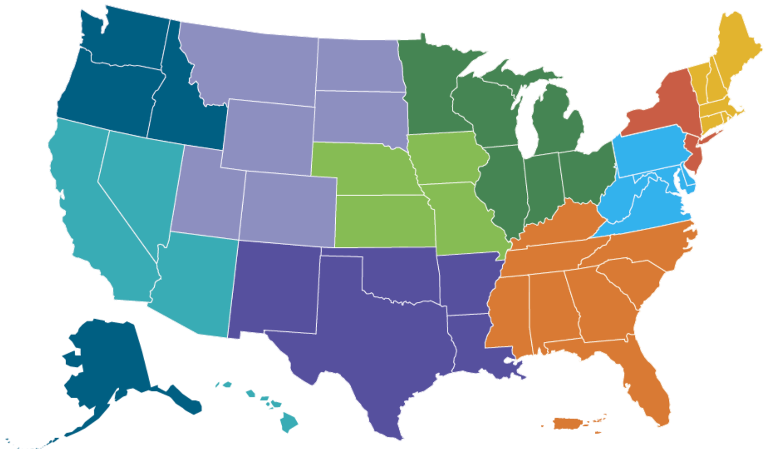
- CHP Concepts, Benefits, Drivers, Trends, and Installation Status
- CHP Market Opportunities
- CHP Technologies
- CHP Project Development Resources
- CHP Project Snapshots

DOE CHP Technical Assistance Partnerships (CHP TAPs)

- **End User Engagement**
  Partner with strategic End Users to advance technical solutions using CHP as a cost effective and resilient way to ensure American competitiveness, utilize local fuels and enhance energy security. CHP TAPs offer fact-based, non-biased engineering support to manufacturing, commercial, institutional and federal facilities and campuses.

- **Stakeholder Engagement**
  Engage with strategic Stakeholders, including regulators, utilities, and policy makers, to identify and reduce the barriers to using CHP to advance regional efficiency, promote energy independence and enhance the nation's resilient grid. CHP TAPs provide fact-based, non-biased education to advance sound CHP programs and policies.

- **Technical Services**
  As leading experts in CHP (as well as microgrids, heat to power, and district energy) the CHP TAPs work with sites to screen for CHP opportunities as well as provide advanced services to maximize the economic impact and reduce the risk of CHP from initial CHP screening to installation.



www.energy.gov/chp

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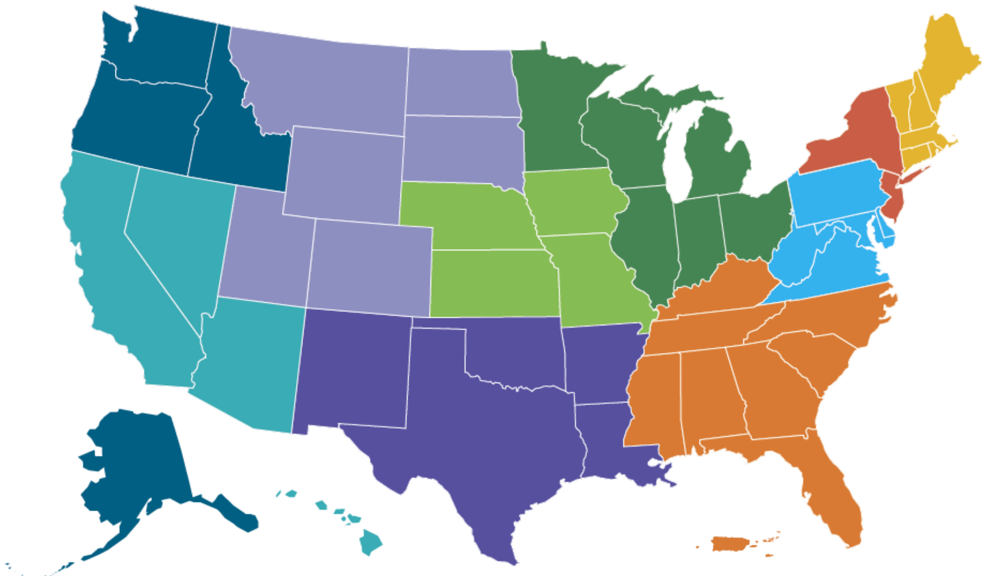

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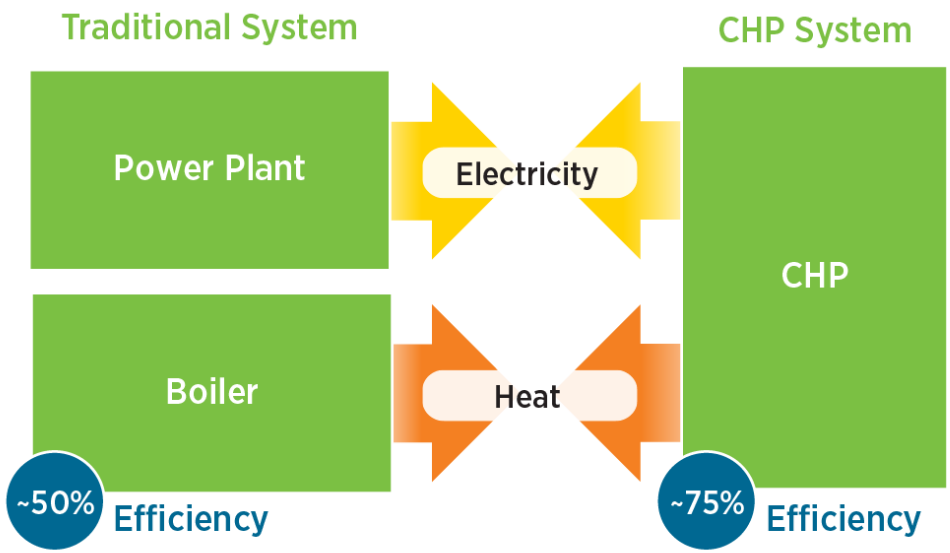
CHP Concepts, Benefits, Drivers, Trends, Installation Status

CHP: A Key Part of Our Energy Future

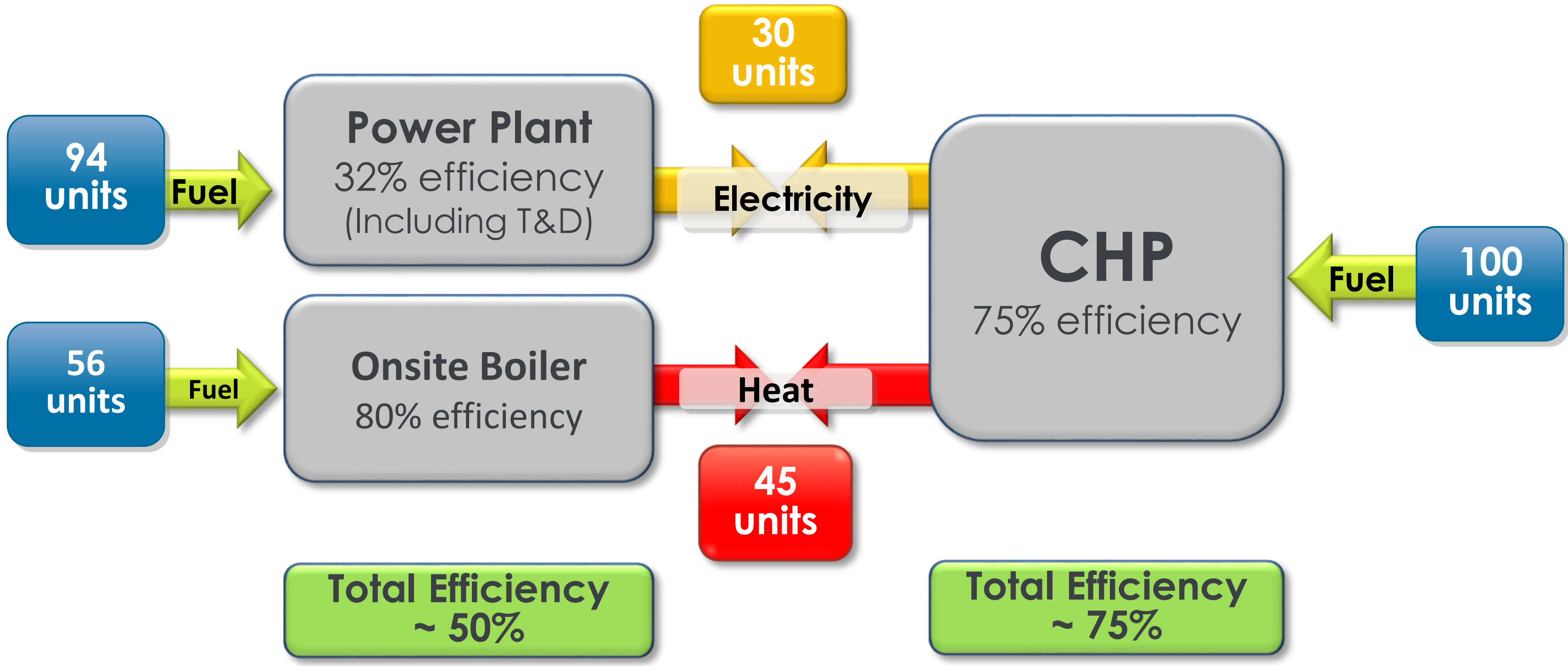
- Form of Distributed Generation (DG)
- An integrated system
- Located at or near a building / facility
- Provides at least a portion of the electrical load and
- Uses thermal energy for:
  - Space Heating / Cooling
  - Process Heating / Cooling
  - Dehumidification



CHP provides efficient, clean, reliable, affordable energy – today and for the future.

Source:
http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_clean_energy_solution.pdf

CHP Recaptures Heat of Generation, Increasing Energy Efficiency, and Reducing GHGs



30 to 55% less greenhouse gas emissions

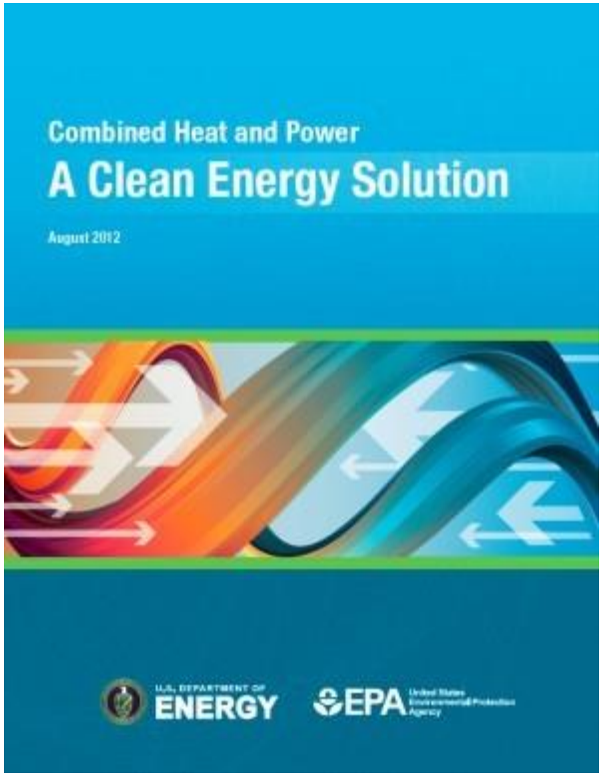
What Are the Benefits of CHP?

- CHP is more efficient than separate generation of electricity and heating/cooling
- Higher efficiency translates to lower operating costs (but requires capital investment)
- Higher efficiency reduces emissions of pollutants
- CHP can also increase energy reliability and enhance power quality

Emerging National Drivers for CHP

- Benefits of CHP recognized by policymakers
  - State Portfolio Standards (RPS, EEPS), Tax Incentives, Grants, standby rates, etc.
- Favorable outlook for natural gas supply and price in North America
- Opportunities created by environmental drivers
- Utilities finding economic value
- Energy resiliency and critical infrastructure

DOE / EPA CHP Report (8/2012)



http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_clean_energy_solution.pdf

CHP & Infrastructure Resiliency

"Critical infrastructure" refers to those assets, systems, and networks that, if incapacitated, would have a substantial negative impact on national security, national economic security, or national public health and safety."

Patriot Act of 2001 Section 1016 (e)

Applications:

- Hospitals and healthcare centers
- Water / wastewater treatment plants
- Police, fire, and public safety
- Centers of refuge (often schools or universities)
- Military/National Security
- Food distribution facilities
- Telecom and data centers

CHP (if properly configured):

- Offers the opportunity to improve Critical Infrastructure (CI) resiliency
- Can continue to operate, providing uninterrupted supply of electricity and heating/cooling to the host facility

CHP Is Used Nationwide In Several Types of Buildings/Facilities

82.6 GW installed at nearly 4,400 sites

Saves 1.8 quads of fuel each year

Avoids 241 M metric tons of CO_2 each year

Source: DOE CHP Installation Database (U.S. installations as of Dec. 31, 2016)

Slide prepared on 5-30-17

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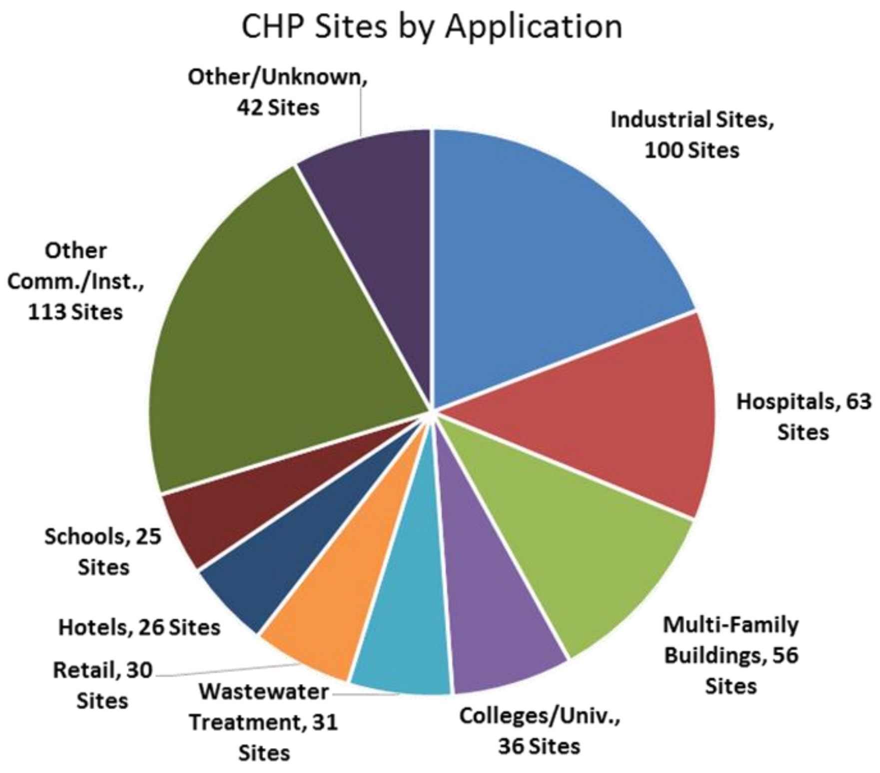
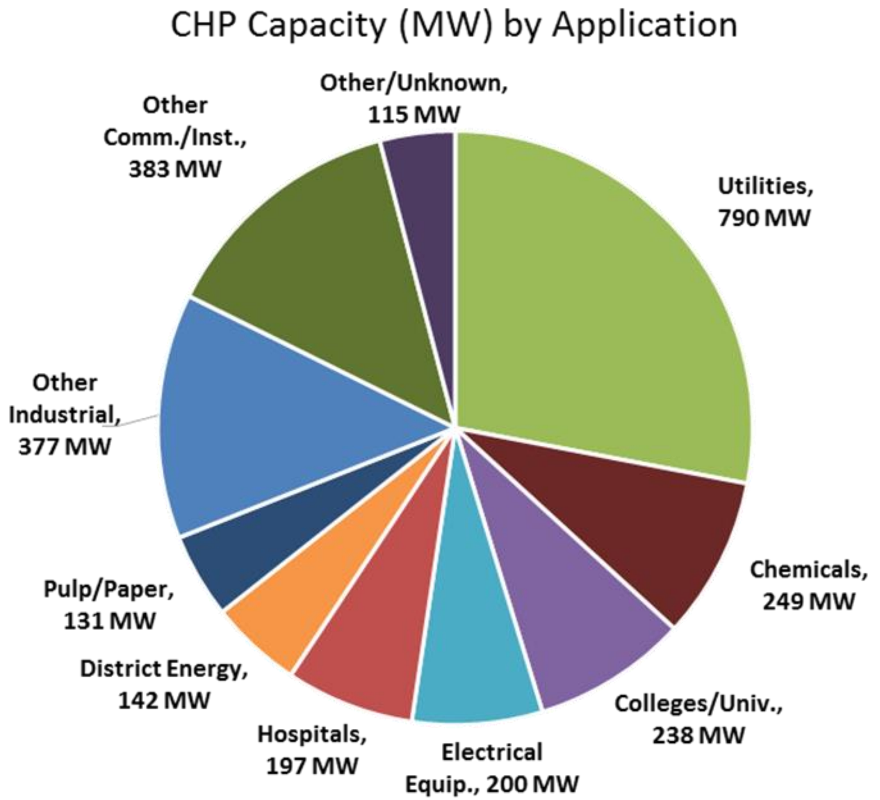
U.S. CHP in Development (523 sites)





Note: There are 33 sites on the Watch List without capacity information

Slide prepared on 5-30-2017

Missouri Existing CHP Installation Summary

21 CHP Sites = 279.3 MW Generating Capacity

Table: Market Sector Type

Market Sector	Sites	MW
Commercial	14	222.2
Industrial	5	52.4
Other	2	4.8
Total	21	279.3

Table: Prime Mover Technology

Technology	Sites	MW
Boiler/Steam Turbine	8	204.6
Combined Cycle	1	4.0
Combustion Turbine	3	40.0
Reciprocating Engine	7	30.6
Fuel Cell	-	-
Microturbine	1	0.1
Waste Heat to Power	1	0.1
Other	-	-
Total	21	279.3

Table: Fuel Type

Fuel Type	Sites	MW
Biomass	4	12.0
Coal	3	111.8
Natural Gas	9	135.1
Oil	2	19.1
Waste	1	0.1
Wood	2	1.3
Other	-	-
Total	21	279.3

Source: U.S. DOE CHP Installation Database
(as of December 2016)
https://doe.icfwebservices.com/chpdb/

CHP Market Opportunities

Attractive CHP Markets

Industrial

- Chemical manufacturing
- Ethanol
- Food processing
- Natural gas pipelines
- Petrochemicals
- Pharmaceuticals
- Pulp and paper
- Refining
- Rubber and plastics

Commercial

- Data centers
- Hotels and casinos
- Multi-family housing
- Laundries
- Apartments
- Office buildings
- Refrigerated warehouses
- Restaurants
- Supermarkets
- Green buildings

Institutional

- Hospitals
- Nursing Homes
- Universities & colleges
- Residential confinement
- Schools (K – 12)
- Wastewater treatment

Agricultural

- Concentrated animal feeding operations
- Dairies
- Wood waste (biomass)

Finding the Best CHP Candidates:

Some or All of These Characteristics

- High and constant thermal load
- Favorable *spark spread**
- Existing central plant

- Planned facility expansion or new construction in next 3-5 years
- Equipment replacement in next 3-5 years

- Power quality or resiliency concerns
- Sustainability goals
- Available utility programs, incentives, rebates, etc.

- Facility "Champion"

** Spark spread for 20+ facilities analyzed in Missouri by the Midwest CHP TAP ranged between $10 and $22 per MMBtu (average ~$16 per MMBtu). A CHP rule-of-thumb for spark spread is $12 per MMBtu which shows potential for a favorable payback.*

Source: Combined Heat and Power (CHP) Resource Guide, www.midwestchptap.org

Market Sector: Colleges/Universities

272 U.S. CHP Sites = 2,763.9 MW Generating Capacity

- Due to large thermal loads and desire for reliable power, CHP is a good fit for colleges and universities
- Number of college and universities use CHP to provide steam and some power to key campus facilities
- Campuses approach energy efficiency and sustainability planning holistically
- 72% of existing CHP for colleges and universities is natural gas-fired, and most institutions use a boiler/steam turbine or gas turbines
- Many college and university CHP systems have been designed to be able to run independently of the grid

Table: CHP Installations in U.S. Colleges & Universities

Fuel Type	Sites	MW
< 1 MW	109	35.4
1 – 4.9 MW	72	170.4
5 – 19.9 MW	54	495.4
20 – 49.9 MW	5	157.7
50 – 99.9 MW	1	55.0
100 – 499.9 MW	1	102.2
Total	272	2,653.9

Sources:
- The Opportunity for CHP in the United States, American Gas Association, May 2013
- DOE CHP Installation Database (U.S. CHP Installations as of December 2016)

Midwest Universities with CHP Systems

49 University and Comm. Colleges = 1,086 MW capacity

UIC
Kent State University
College of Medicine and Life Sciences, The University of Toledo
Indiana State University
Purdue University
University of Notre Dame
Western Michigan University
SIU Southern Illinois University Carbondale
Mizzou University of Missouri
Loyola Medicine
University of Michigan
Northeastern Illinois University
Illinois Institute of Technology
Illinois, University of Illinois at Urbana-Champaign
Wisconsin, University of Wisconsin–Madison
University of Wisconsin Whitewater
University of Minnesota
The University of Iowa
University of Northern Iowa
Iowa State University
CMU Central Michigan University
Michigan State University
University of Cincinnati
Kansas State University
University of Nebraska Lincoln

Source: www.energy.gov/eere/amo/chp-deployment (facilities with >2 MW capacity displayed)

Market Sector: Hospitals

220 U.S. CHP Sites = 819.4 MW Generating Capacity

- Most hospital CHP systems consist of gas turbines, and reciprocating engines
- 84% of existing hospital CHP capacity is natural gas
- Attractive characteristics for CHP
  - **Practical…** hospitals operate 24/7 and have significant needs for electric power, heating, and cooling
  - **Proven…** CHP is a proven, well understood application that can be easily maintained with existing trained staff (220 hospitals with CHP)
  - **Economic…** efficient CHP systems can lead to attractive investments with electric and thermal energy savings operating reliably 15 years or more
  - **Reliable…** with disruptions to electric distribution systems and exposing fragilities to back-up power systems… hospitals with CHP systems have provided a "dynamic asset" with an economic return running every day (as opposed to emergency generators)
  - **Clean…** low emissions CHP systems have been recognized as the centerpiece of sustainability strategies at premier hospitals reducing a hospital's greenhouse gas impacts by almost 20% with a single CHP investment

Table: CHP Installations in U.S. Hospitals

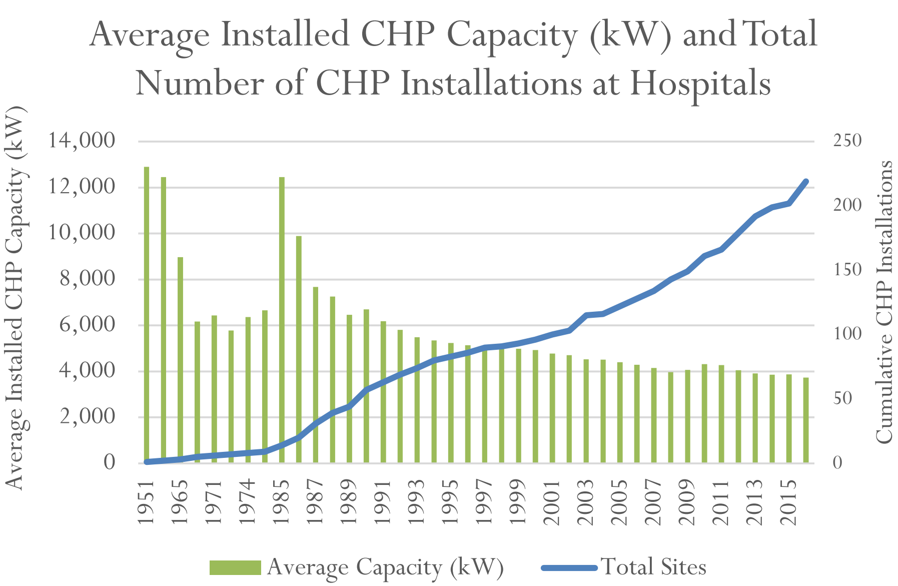
Fuel Type	Sites	MW
< 1 MW	102	36.0
1 – 4.9 MW	82	205.8
5 – 19.9 MW	29	262.6
20 – 49.9 MW	5	157.7
50 – 499.9 MW	2	157.2
Total	220	819.4

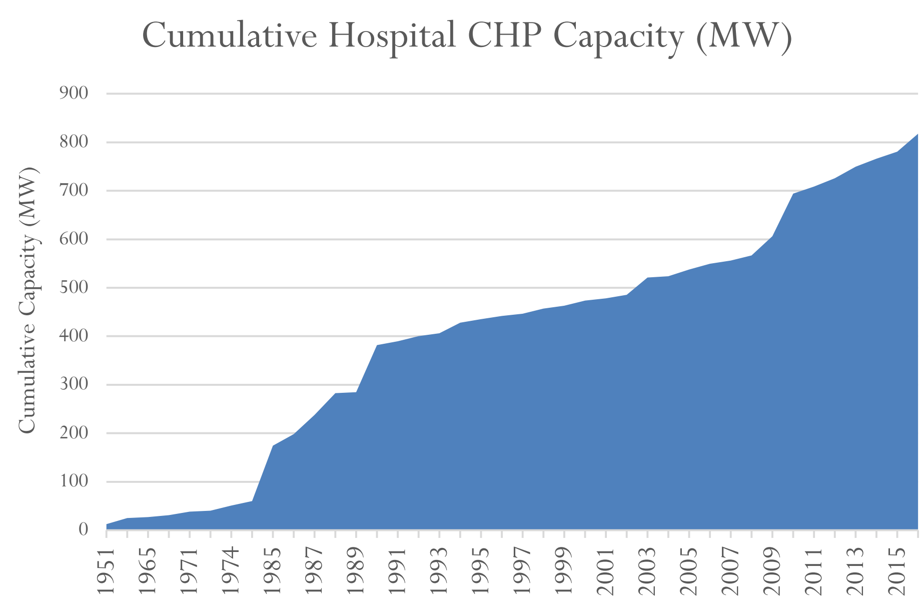
Sources:

- The Opportunity for CHP in the United States, American Gas Association, May 2013
- DOE CHP Installation Database (U.S. CHP Installations as of December 2016)

Existing CHP in Hospitals

- Installed capacity steadily growing
- Installations trending towards slightly smaller systems (~3.7 MW in 2016)





Source: DOE CHP Installation Database (U.S. installations as of December 31, 2016)

Market Sector: Nursing Homes

148 U.S. CHP Sites = 23.6 MW Generating Capacity

- These CHP systems are smaller, typically less than 1 MW systems
- 97% of nursing home CHP capacity is natural gas
- 136 nursing homes use reciprocating engines, 10 use microturbines
- Nursing homes require electric and thermal energy round-the-clock, have central heating systems, and provide domestic hot water to its rooms and residents. Many facilities need electricity for medical equipment, lighting, and other technologies.
- Need reliable power

Table: CHP Installations in U.S. Nursing Homes

Fuel Type	Sites	MW
< 1 MW	145	20.4
1 – 4.9 MW	3	3.2
Total	148	23.6

Sources:
- The Opportunity for CHP in the United States, American Gas Association, May 2013
- DOE CHP Installation Database (U.S. CHP Installations as of December 2016)

Market Sector: Correctional Facilities

49 U.S. CHP Sites = 168.9 MW Generating Capacity

- ~50% of correctional facilities use reciprocating engines
- Steam turbines, combustion turbines, microturbines, and fuel cells are also being utilized in correctional facilities
- Most CHP applications are fueled by natural gas; some are utilizing biomass, coal, and other fuels
- Correctional facilities generally have a significant coincident thermal/electric load profile to serve space heating, domestic hot water (DHW), laundry, cooking, space cooling, lighting, and plug loads.

Table: CHP Installations in U.S. Correctional Facilities and Courts

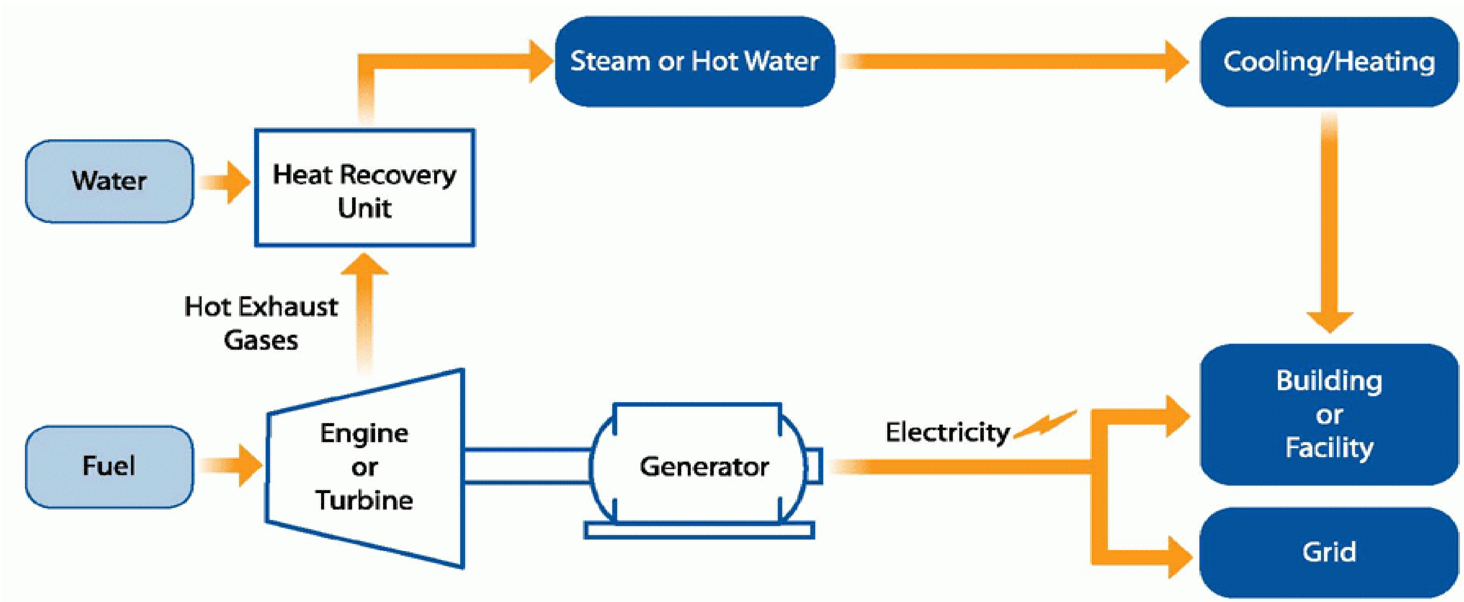
Fuel Type	Sites	MW
< 1 MW	29	8.2
1 – 4.9 MW	14	37.6
5 – 19.9 MW	3	19.0
20 – 49.9 MW	3	104.1
Total	49	168.9

Sources:
- The Opportunity for CHP in the United States, American Gas Association, May 2013
- DOE CHP Installation Database (U.S. CHP Installations as of December 2016)

CHP Technologies

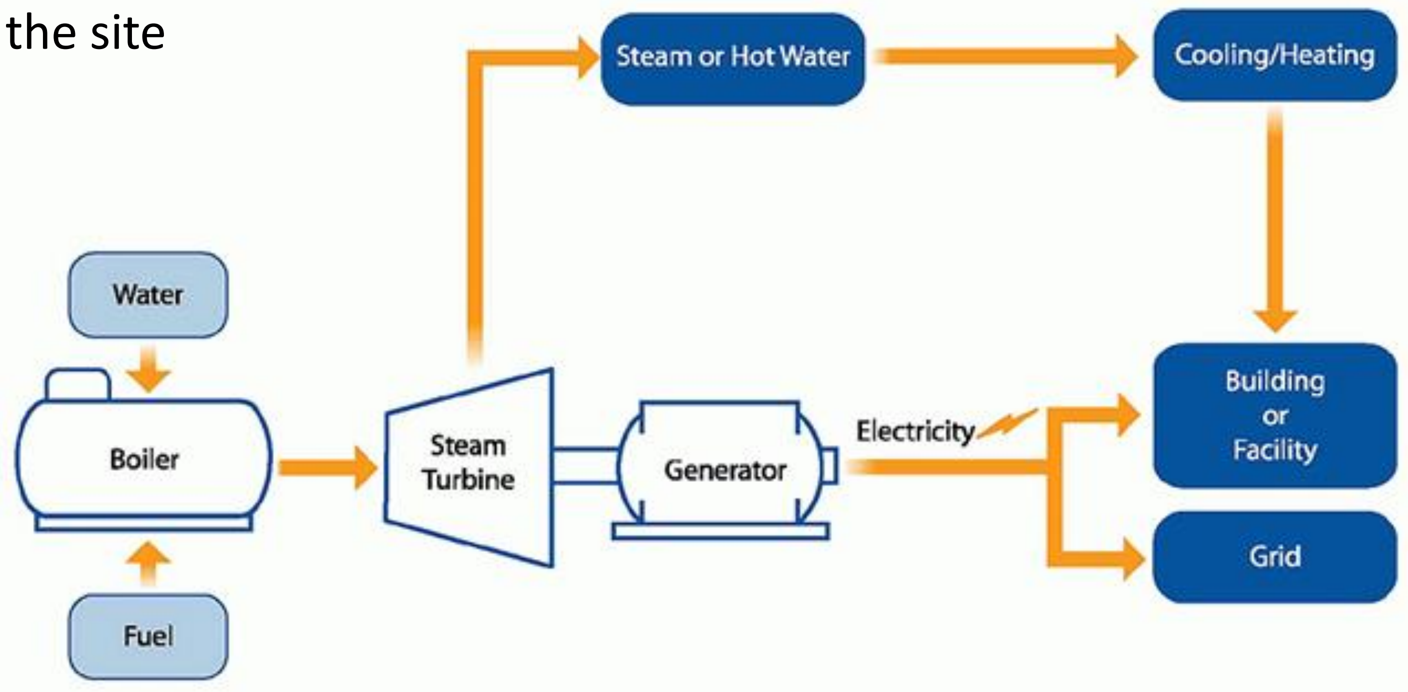
Reciprocating Engine or Turbine with Heat Recovery

- Gas or liquid fuel is combusted in a prime mover, such as a reciprocating engine, microturbine, or gas turbine
- The prime mover is connected to a generator that produces electricity
- Energy normally lost in the prime mover's hot exhaust and cooling system is recovered to provide useful thermal energy for the site

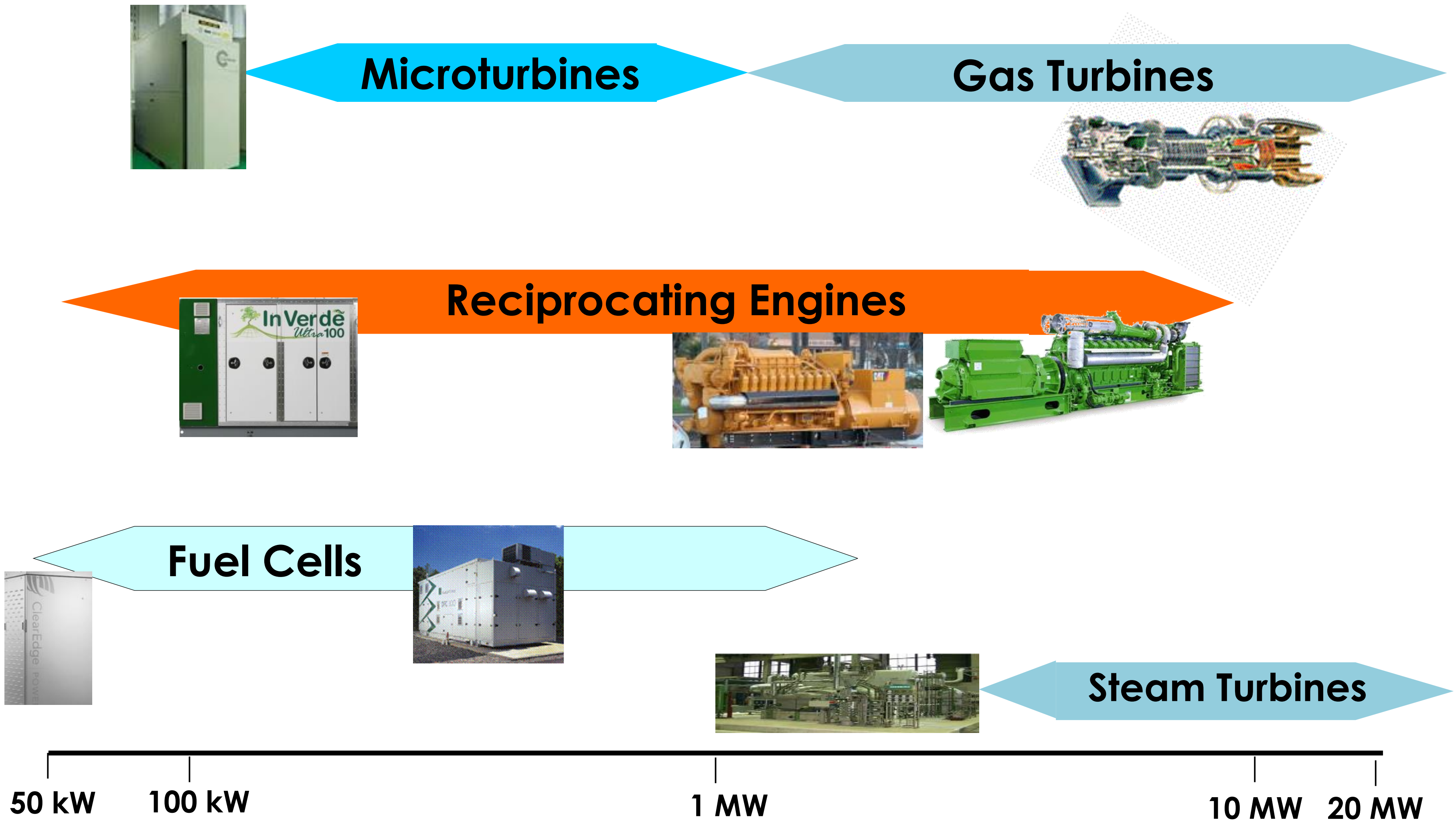


CHP with Boiler / Steam Turbine

- Fuel is burned in a boiler to produce high pressure steam that is sent to a backpressure or extraction steam turbine
- The steam turbine is connected to an electric generator that produces electricity
- Low pressure steam exits the turbine and provides useful thermal energy for the site



Common CHP Technologies and Generating Capacity Ranges



Heat Recovery

- **Heat Exchangers**
  - Recover exhaust gas from prime mover
  - Transfers exhaust gas into useful heat (steam, hot water) for downstream applications
  - Heat Recovery Steam Generators (HRSG) the most common

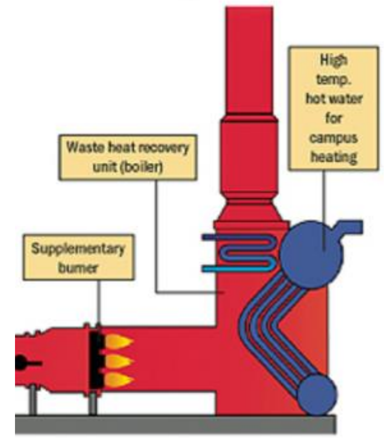


Image Source: University of Calgary

- **Heat-Driven Chillers**
  - Absorption Chiller
    - Use heat to chill water
    - Chemical process (not mechanical)
  - Steam Turbine Centrifugal Chiller

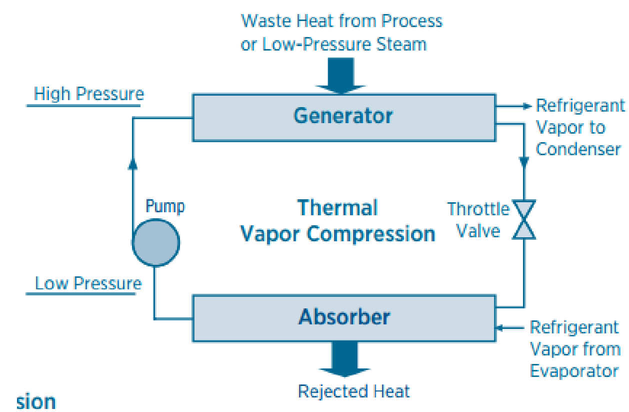
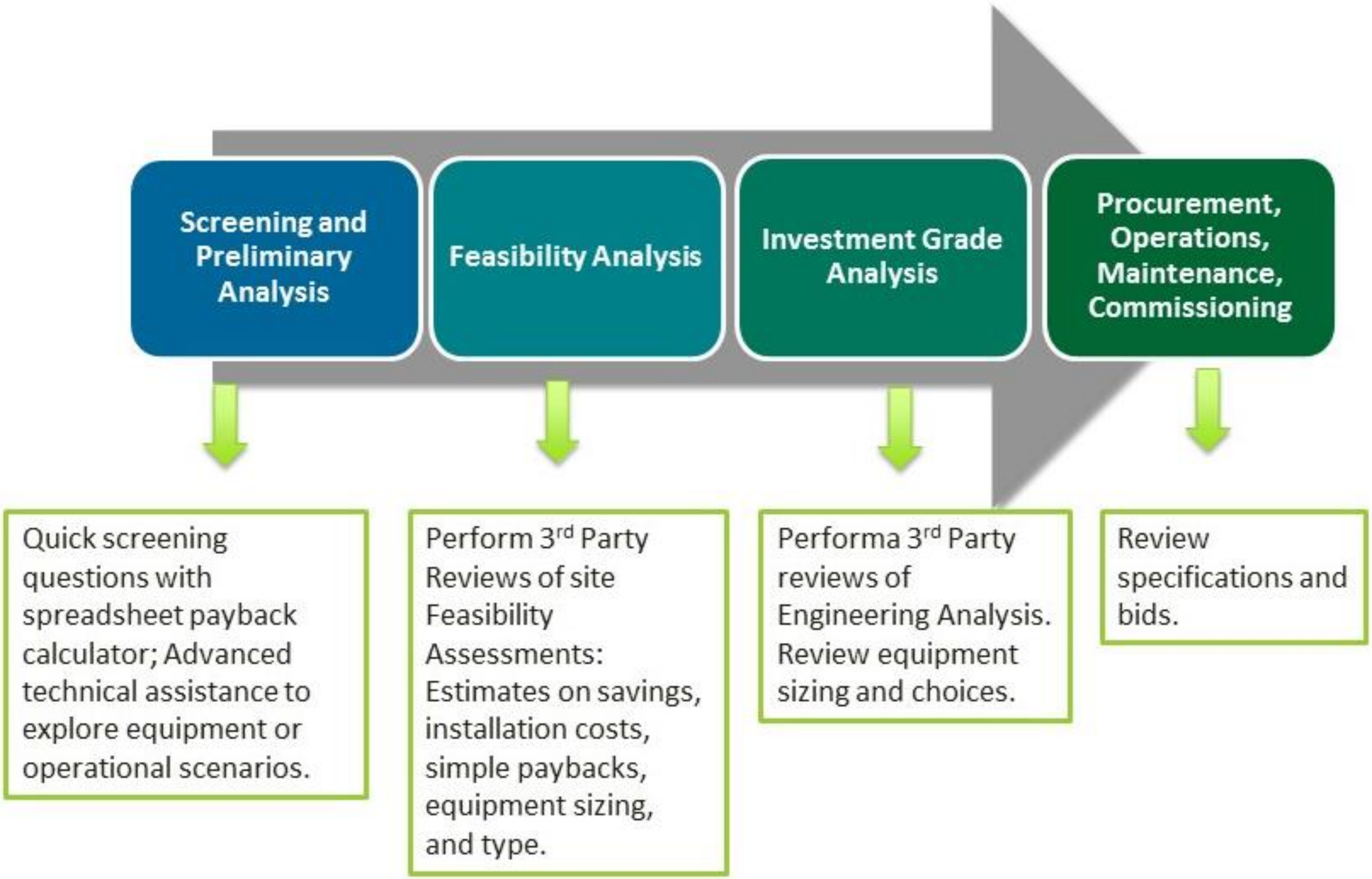


Image Source: DOE - EERE

CHP Project Development Resources

CHP TAP Role: Technical Assistance



DOE TAP CHP Screening Analysis

- High level assessment to determine if site shows potential for a CHP project
  - Quantitative Analysis
    - Energy Consumption & Costs
    - Estimated Energy Savings & Payback
    - CHP System Sizing
  - Qualitative Analysis
    - Understanding project drivers
    - Understanding site peculiarities
  - SSR Tool

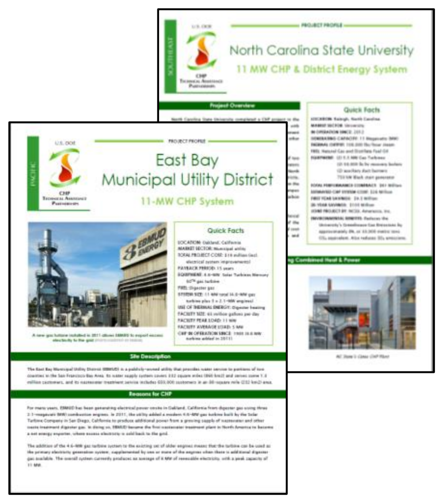
Annual Energy Consumption		
	Base Case	CHP Case
Purchased Electricty, kWh	88,250,160	5,534,150
Generated Electricity, kWh	0	82,716,010
On-site Thermal, MMBtu	426,000	18,872
CHP Thermal, MMBtu	0	407,128
Boiler Fuel, MMBtu	532,500	23,590
CHP Fuel, MMBtu	0	969,845
Total Fuel, MMBtu	532,500	993,435
Annual Operating Costs		
Purchased Electricity, $	$7,060,013	$1,104,460
Standby Power, $	$0	$0
On-site Thermal Fuel, $	$3,195,000	$141,539
CHP Fuel, $	$0	$5,819,071
Incremental O&M, $	$0	$744,444
Total Operating Costs, $	$10,255,013	$7,809,514
Simple Payback		
Annual Operating Savings, $		$2,445,499
Total Installed Costs, $/kW		$1,400
Total Installed Costs, $/k		$12,990,000
Simple Payback, Years		**5.3**
Operating Costs to Generate		
Fuel Costs, $/kWh		$0.070
Thermal Credit, $/kWh		($0.037)
Incremental O&M, $/kWh		$0.009
Total Operating Costs to Generate, $/kWh		**$0.042**

CHP Project Resources

CHP Technology Fact Sheets
(performance characteristics, capital and O&M costs, emissions, etc.)

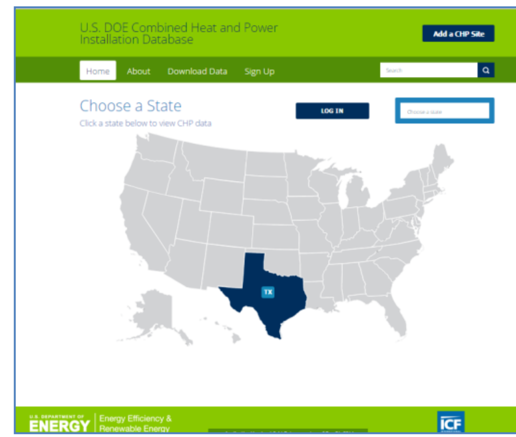
https://energy.gov/eere/amo/combined-heat-and-power-basics#factsheet

DOE Project Profile Database
(100+ case studies)



energy.gov/chp-projects

DOE CHP Installation Database
(List of all known CHP systems in U.S.)



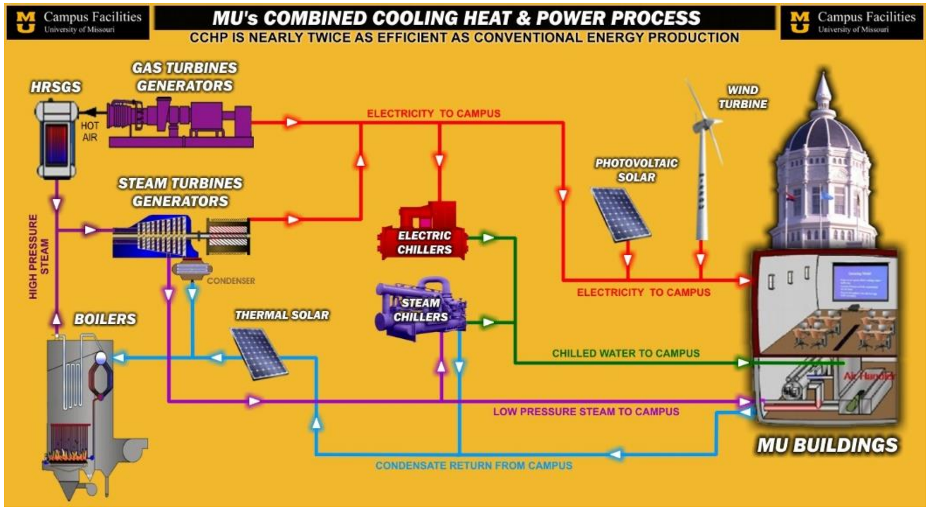
energy.gov/chp-installs

CHP Project Snapshots

Project Snapshot:
Award Winning District Energy System with CHP

University of Missouri
Columbia, MO

Application/Industry: University Campus
Capacity: 66 MW
Prime Mover: Steam turbines, gas turbines
Fuel Type: Biomass, Natural gas, Coal
Thermal Use: Steam, heating, cooling
Installation Year: 1961



Highlights: MU has been producing energy using various forms of CHP since 1892. The system provides district heating and cooling as well as a microgrid with 66 MW of electric capacity serving more than 15 million square feet of campus buildings with a reliability >99.99%. The system has twice been recognized by the International District Energy Association (2004 and 2017) as District Energy System of the Year.

Testimonial: *"It is extremely rewarding for our campus district energy system to be recognized by IDEA as one of the best of the best. I'm very proud of our staff's contribution in helping us win this prestigious award by delivering highly reliable, cost-effective and sustainable utility services to the Mizzou campus."* Gregg Coffin, Campus Facilities Energy Mgt. Director

Source:
www.energy.gov/chp-installs
www.epa.gov/chp/our-partners
www.cf.missouri.edu/cf/em/eff

Project Snapshot:

Energy Security

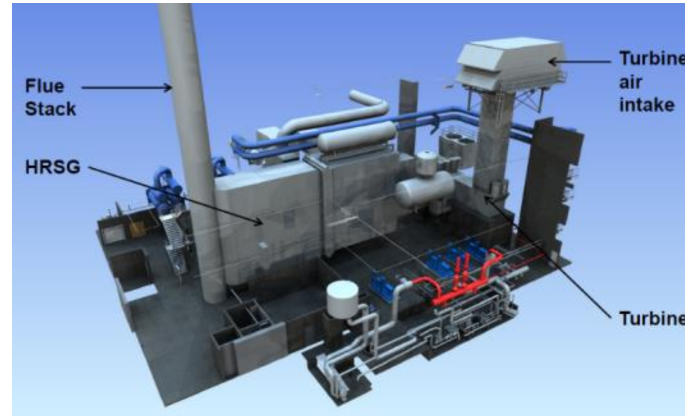
University of Minnesota
Minneapolis, MN

Application/Industry: University Campus
Capacity: 25 MW
Prime Mover: Combustion turbine
Fuel Type: Natural gas
Thermal Use: Steam, heating, cooling
Installation Year: 2017

Highlights: The CHP system decreases the Twin Cities Campus carbon footprint by 15% and provides an 8-year return on investment. The 25 MW system heats the entire campus and meets half of its electricity demand.

Testimonial: *"We see CHP as a way to be competitive with other schools and to protect research if we had a catastrophy."*
- Jerome Malmquist, University Director of Energy Management

UNIVERSITY OF MINNESOTA
Driven to Discover®



Rendering of turbine and heat recovery steam generator.

Minimal changes will need to be made to the existing building's exterior.

Source: http://www1.umn.edu/regents//docket/2012/february/heatandpower.pdf
http://midwestenergynews.com/2014/12/02/university-turns-to-combined-heat-and-power-for-climate-goals/

Project Snapshot:

Replacing Outdated Coal-fired Boiler House

Kent State University

Kent, OH

Application/Industry: University

Capacity (MW): 12 MW

Prime Mover: Gas Turbine

Fuel Type: Natural Gas

Thermal Use: Heating and cooling

Installation Year: 2003, 2005

Emissions Savings: Reduces CO_2 emissions by 37,000 tons/year

Testimonial: *"It is a very clean technology, and it is an economic saving for us. By using steam and electricity, we are able to offset the costs for heating the campus. It's kind of like recycling."*

- Thomas Dunn, Associate Director for Campus Environment and Operations

Source: https://mysolar.cat.com/cda/files/2111485/7/dschp-ksu.pdf

U.S. Department of Energy
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Project Snapshot:

Interactive CHP System

Washtenaw Community College
Ann Arbor, MI

Application/Industry: College
Capacity (MW): 130 kW
Prime Mover: Microturbine
Fuel Type: Natural Gas
Thermal Use: Hot Water, Cooling
Installation Year: 2014
Energy Savings: >$60,000/year

Highlights: The microturbine CHP system at Washtenaw Community College is equipped with a FlexSet control system. The web-based system allows facility managers to monitor the system on computers or cell phones. The system's designer, GEM Energy, also donated an additional microturbine to the school for the training of future energy professionals.

Washtenaw Community College

Source: http://www.gemenergy.com/wp-content/uploads/2014/10/CHP-Washtenaw-102814.pdf

Project Snapshot:
Resiliency and Disaster Relief

Mississippi Baptist Medical Center
Jackson, Mississippi

Application/Industry: Healthcare
Capacity (MW): 4.2 MW
Prime Mover: Solar Centaur Gas Turbine
Fuel Type: Natural Gas
Thermal Use: Hot water
Installation Year: 1991

Highlights: For more than four days after Hurricane Katrina hit the region, MBMC 's CHP system provided power and thermal energy to the hospital. MBMC was the only hospital in the Jackson metro area to remain nearly 100% operational following the storm. MBMC was able to receive displaced patients from other hospitals and serve as an operations center for emergency responders.

Baptist HEALTH SYSTEMS

Source: http://http://southeastchptap.rlmartin.com/Data/Sites/4/documents/profiles/Mississippi_Baptist_Medical_Center-CHP_Project_Profile.pdf

Project Snapshot:

Enhanced-Use Leasing of a CHP Project

U.S. Department of Veterans Affairs

Jesse Brown VA Medical Center
Chicago, IL

Application/Industry: Healthcare
Capacity: 3.4 MW
Prime Mover: Combustion turbine
Fuel Type: Natural gas
Thermal Use: Building heat and absorption cooling
Installation Year: 2003

Highlights: Reliable power is critical in hospitals to maintain patient safety and staff and patient satisfaction. The CHP system maintains an annual availability of over 98% and the remaining <2% of the time the system may be down for maintenance. This allows for the system to provide a reliable source of prime power to the medical center and another layer of electric redundancy in combination with the grid connection and emergency generators to ensure electricity is available when needed.

Source: http://www.midwestchptap.org/profiles/ProjectProfiles/JesseBrownVA%20.pdf

Project Snapshot:
100% Energy Independence

Gundersen Health System
La Crosse, WI

Application/Industry: Hospital

Capacity: 500 kW

Prime Mover: Boiler/steam turbine

Fuel Type: Biomass

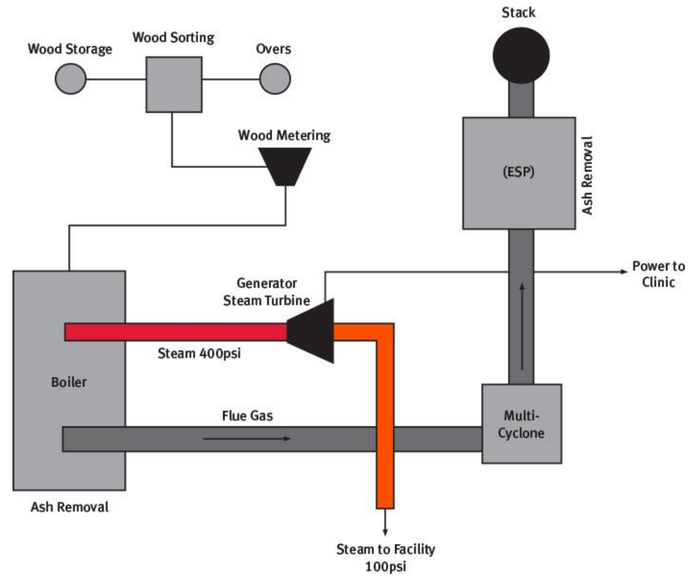
Thermal Use: Heating, hot water, sterilization

Installation Year: 2013

Energy Savings: $500,000/year

Highlights: Gundersen Health System received a $225,000 grant from the U.S. Forest Service through the Wisconsin Dept. of Administration for the biomass CHP system at their La Crosse campus. Gundersen Health system reached 100% energy independence in 2014 thanks to their 4 CHP systems at their campuses.

GUNDERSEN HEALTH SYSTEM®



Source: http://www.gundersenhealth.org/news/gundersen-powers-up-biomass-boiler, http://lacrossetribune.com/news/local/gundersen-s-new-wood-chip-boiler-taps-region-s-resources/article_79024da6-b2c7-11e2-8d3a-0019bb2963f4.html

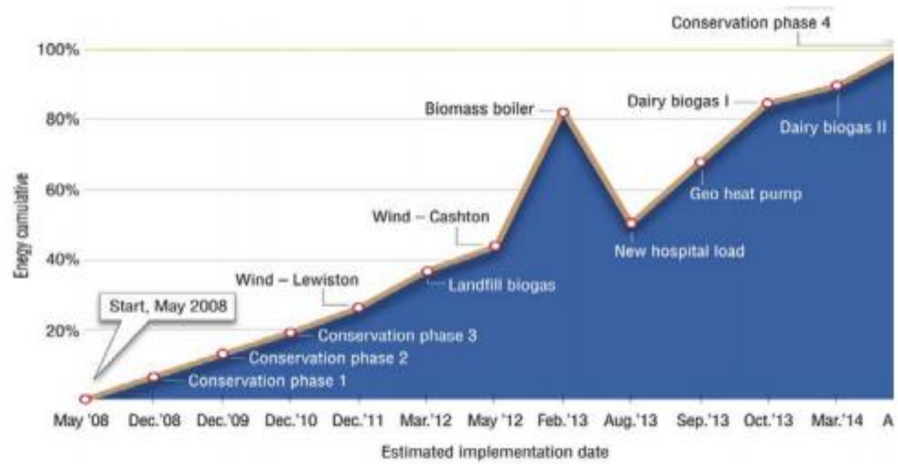
Project Snapshot:

Public-Private Partnership

GUNDERSEN
HEALTH SYSTEM®
Where Caring Meets Excellence

Gundersen Health System: Onalaska Campus
Onalaska, WI

Application/Industry: Healthcare
Capacity: 1.137 MW
Prime Mover: Reciprocating engine
Fuel Type: Landfill gas
Thermal Use: Space heating and hot water
Installation Year: 2012
Energy Savings: $400,000



Testimonials: *"The project should pay back quite nicely because it's offsetting a big portion of our electricity bill as well as our natural gas bill and we're providing a revenue stream for the county."* - Jeff Rich, Executive Director, GL Envision, Gunderson Health System

"This is a great use of a previously unused natural resource and it is an excellent example of what a public-private partnership can achieve in our community."
- Hank Koch, Solid Waste Director, La Crosse County

Source:
http://www.midwestchptap.org/profiles/ProjectProfiles/GundersenLutheranOnalaska.pdf

Project Snapshot:

Increased ENERGY STAR Building Score

PROMEDICA | WELL CONNECTED.

ProMedica Health System Wildwood

Toledo, OH

Application/Industry: Hospital

Capacity: 130 kW

Prime Mover: Microturbine

Fuel Type: Natural gas

Thermal Use: Heating

Installation Year: 2013

Energy Savings: Unknown

Highlights: The microturbine CHP system at ProMedica Wildwood is equipped with a FlexSet control system. The control system is web-based, allowing the facility mangers to monitor the system operation and performance on computers or cell phones.

Source: http://www.gemenergy.com/wpcontent/uploads/2014/03/optimize-chp-flexset-ProMedicaWildwood-030414.pdf

Project Snapshot:
Energy Security

Presbyterian Homes

Evanston, IL

Application/Industry: Nursing Home

Capacity: 2.4 MW

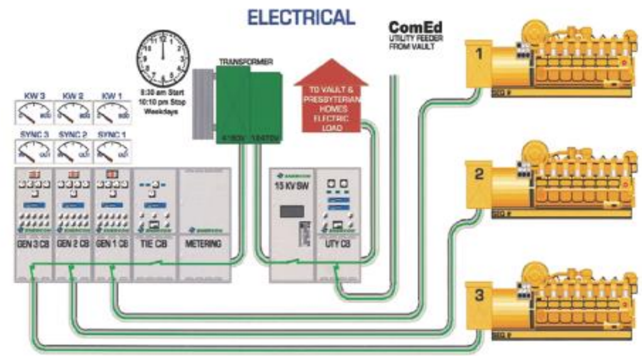
Prime Mover: Reciprocating Engines

Fuel Type: Natural gas

Thermal Use: Building heat and domestic hot water

Installation Year: 2001

Highlights: An ice storm in the winter of 1998 knocked out power for 9 hours. 600 senior residents were transferred to safety during this time. CHP was installed to avoid future outages



"The environment we provide to elderly adults had everything to do with our decision to pursue power generation. Loss of power isn't an option. Lives depend on it."
- Keith Stohlgren, V/P Operations

"We had no power for nine hours one cold, winter day during an ice storm. The loss of power forced us to take immediate, aggressive measures to ensure the comfort and safety of our residents."
– Nancy Heald Tolan, Director of Facilities Management

Project Snapshot:
2009 EPA ENERGY STAR CHP AWARD

Bridgewater Correctional Complex

Bridgewater, MA

Source: www.mass.gov

Application/Industry: Correctional

Capacity: 1,500 kW

Prime Mover: Combustion Turbine

Fuel Type: Natural Gas

Thermal Use: Heating, cooking, cleaning, domestic hot water

Installation Year: 2006

Source: www.dmiinc.com

Highlights: The correctional complex consists of 785,000 square feet of living and working space on 14,900 acres. The CHP system generates ~80% of the electric demand. Operation of the CHP system allowed the Massachusetts Department of Correction to shut down an old and more-polluting diesel engine generator. With an operating efficiency of approximately 67%, the CHP system requires approximately 17% less fuel than typical onsite thermal generation and purchased electricity.

Source: www.epa.gov/CHP/energy-star-CHP-awards

Summary

- CHP is a proven technology providing energy savings, reduced costs, and opportunities for resiliency
- Emerging drivers are creating new opportunities to evaluate CHP today
- Resources are available to assist in developing CHP Projects
- Contact the US DOE Midwest-Central CHP TAP to receive a complementary CHP qualification screening or other technical assistance

Thank You

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U.S. Department of Energy
CHP Technical Assistance Partnerships
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www.energy.gov/chp